

Remarks

Claims 1-3, 5-16, 18-20 and 22-26 are pending herein. By this Amendment, claims 1, 20, 24 and 26 have been amended.

Claim 1 has been amended to limit the polystyrene polymer to polystyrene polymers selected from the group consisting of polystyrene homopolymers consisting of styrene units, acrylonitrile butadiene styrene polymers, and high impact polystyrene polymers. Claim 26 has also been amended to limit the vinyl aromatic resin to the aforementioned three polymers. Support for this amendment can be found in the specification at, e.g., page 1, line 13, and page 4, lines 15-20. Applicants submit that this amendment does not raise new issues since the specifically mentioned polystyrene polymers are within the scope of the broader term "polystyrene polymer" which has already been considered by the Examiner.

Claims 20 and 26 (in part) have been amended to insert the term --copolymer-- after the term "pentablock". Applicants submit that this amendment does not raise new issues but merely clarifies that the pentablock is a copolymer.

Claim 24 has been amended to replace the term "polydienes" with the term --polymerized dienes--. Applicants submit that this amendment does not raise new issues but clarifies what was meant by the term "polydienes".

Applicants respectfully request that this Amendment be entered.

In the Office Action, claims 19, 24 and 26 are rejected under 35 U.S.C. § 112, second paragraph; claims 1-3, 5-16, 18, 19 and 22 are rejected under 35 U.S.C. § 102(b) as being anticipated by Gottschalk et al., Macromol. Symp. 83, 127-146, 1994 ("Gottschalk et al."); claims 1-26 are rejected under 35 U.S.C. § 102(b) as being anticipated by Mehler; and claims 1-3, 5-16, 18-20 and 22-26 are rejected under § 102(b) as being anticipated by DE 4240445 to Gottschalk ("DE '445").

In view of the amendments and remarks herein, Applicants respectfully request reconsideration and withdrawal of the rejections set forth in the Office Action.

I. Rejection under 35 U.S.C. §112

Claims 19, 24 and 26 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention.

According to the Office Action, it is not clear if the S-B-S block copolymers recited in claim 19 are meant to be different from the S-B-M block copolymers of claim 1 given that the definitions for S and M overlap, i.e., there is nothing excluding the possibility that the block S is a methyl methacrylate containing block.

The S-B-S block copolymers recited in claim 19 are meant to be different from the S-B-M copolymers of claim 1. The specification explains at page 8, lines 4-14 that the "S" and "B" blocks of the triblock S-B-S consist of monomers as the "S" and "B" blocks of the triblock S-B-M. However, as described in the specification at page 3, lines 14-15, the "S" block is incompatible with the "M". Thus, because they are incompatible with one another, "S" and "M" are not the same.

The Office Action states that claim 24 is unclear because it recites that the B block comprises dienes and polydienes. According to the Office Action, the term "polydienes" is redundant and it appears that the dienes are in fact polymerized dienes.

Claim 24 has been amended to change "polydienes" to --polymerized dienes--.

Claim 26 is said to be unclear because the last line refers to a "pentablock" without reciting what the pentablock is. Claim 26 has been amended to add the term "copolymer" after the term --pentablock--.

II. Rejection under 35 U.S.C. §102(b) Based on Gottschalk et al.

Claims 1-3, 5-16, 18, 19 and 22-26 are rejected under 35 U.S.C. §102(b) as being anticipated by Gottschalk et al.

According to the Office Action, if the instant claims are amended to recite that the polystyrene polymer is a homopolymer, the § 102 rejections based on Gottschalk et al. and on DE '445 (discussed below) will be overcome.

As noted previously, claim 1 has been amended to limit the polystyrene polymer to polystyrene polymers selected from the group consisting of polystyrene homopolymers consisting of styrene units, acrylonitrile butadiene styrene polymers, and high impact polystyrene polymers. Claim 26 has been amended to limit the vinyl aromatic resin to the aforementioned three polymers.

Applicants submit that Gottschalk et al. does not teach amended claims 1 and 26. Gottschalk et al., as recognized in the Office Action, does not teach the use of a polystyrene homopolymer. In addition, Gottschalk et al. does not teach the use of the S-B-M block copolymer nor combinations of ABS or high impact polystyrene polymers with S-B-M copolymers.

Thus, for at least this reason, Applicants submit that the instant claims are not anticipated by Gottschalk et al.

III. Rejection under 35 U.S.C. §102(b) Based on Mehler

Claims 1-26 are rejected under 35 U.S.C. §102(b) as being anticipated by Mehler. According to the Office Action:

With regard to Mehler, this reference discloses blends of polyphenylene ether and styrene. Note the caption for Figure 5 on page 1874 which discloses a blend of PPE/HIPS, i.e., a blend of polyphenylene ether and polystyrene containing rubber. While SAN is apparently present in this blend, the instant claims do not exclude such (emphasis by Examiner).

Mehler requires the use of SAN (i.e., styrene acrylonitrile). Claims 1 and 26 have been amended herein so that the polystyrene polymer (claim 1) or the aromatic vinyl resin (claim 26) are limited to three specific polystyrene polymers, none of which are SAN. Thus, Applicants submit that SAN is excluded from these claims and that they, as well as claims 2-25, are not anticipated by Mehler.

IV. Rejection under 35 U.S.C. §102(b) Based on DE '445

Claims 1-3, 5-16, 18-20 and 22-26 are rejected under 35 U.S.C. §102(b) as being anticipated by DE '445.

As mentioned above, the Office Action states that if the claims are amended to recite that the polystyrene polymer is a homopolymer, the §102 rejections based on Gottschalk et al. and on DE '445 (discussed below) will be overcome.

DE '445 requires the presence of SAN. As discussed above, claims 1 and 26 have been amended herein so as to exclude SAN from the polystyrene polymers (claim 1) or aromatic vinyl resins (claim 26) recited in these claims.

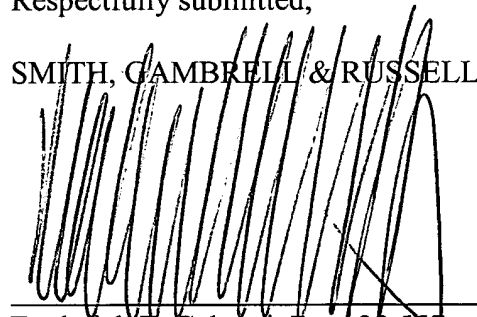
In view of the amendment to claims 1 and 26, Applicants respectfully submit that the instant claims are not anticipated by DE '445.

V. Conclusion

In view of the amendments and remarks herein, Applicants respectfully request that the rejections set forth in the Office Action be withdrawn and that the instant claims be allowed.

Respectfully submitted,

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Date : May 27, 2003

Listing of Claims

Claim 1 (currently amended): Rigid material based on PPO and a polystyrene polymer with improved impact strength comprising:

- 99 to 20% of a resin (A) consisting of a mixture of PPO and of a polystyrene polymer, the polystyrene polymer being selected from the group consisting of polystyrene homopolymers consisting of styrene units, acrylonitrile butadiene styrene polymers, and high impact polystyrene polymers, and
- 1 to 80% of an impact modifier comprising at least one block copolymer S-B-M in which:
 - each block is linked to the other by a covalent bond or an intermediate molecule linked to one of the blocks by a covalent bond and to the other block by another covalent bond,
 - M consists of MMA monomers optionally copolymerized with other monomers and comprises at least 50% by weight of methyl methacrylate (MMA),
 - B is incompatible with the resin (A) and with the M block and its glass transition temperature T_g is less than 0°C ,
 - S is incompatible with the B block and the M block and its T_g or its melting point m.p. is greater than the T_g of B,
 - S is compatible with the resin (A).

Claim 2 (previously amended): Material according to Claim 1, wherein the M blocks comprise at least 60% by mass of syndiotactic PMMA.

Claim 3 (original): Material according to Claim 1, wherein the M blocks comprise reactive monomers, which include glycidyl methacrylate or tert-butyl methacrylate.

Claim 4 (cancelled)

Claim 5 (previously amended): Material according to Claim 1, wherein the Tg of the B blocks is less than -40°C .

Claim 6 (previously amended): Material according to Claim 24, wherein the B blocks consist essentially of 1,4-polybutadiene.

Claim 7 (previously amended): Material according to Claim 24, wherein the dienes of the B block are hydrogenated.

Claim 8 (previously amended) Material according to Claim 25, wherein the B block consists of poly(butyl acrylate).

Claim 9 (original): Material according to Claim 1, wherein the Tg or m.p. of S is greater than 23°C .

Claim 10 (original): Material according to Claim 9, wherein the Tg or the m.p. of S is greater than 50°C .

Claim 11 (original): Material according to Claim 10, wherein S is polystyrene.

Claim 12 (previously amended): Material according to Claim 1, wherein the number-average molar mass of the block copolymer S-B-M is between 10,000 g/mol and 500,000 g/mol.

Claim 13 (previously amended) Material according to Claim 12, wherein the number-average molar mass of the block copolymer S-B-M is between 20,000 g/mol and 200,000 g/mol.

Claim 14 (previously amended) Material according to Claim 1, comprising from 1 to 35% of the impact modifier and from 99 to 65% of resin (A).

Claim 15 (previously amended) Material according to Claim 14, comprising from 4 to 25% of the impact modifier and from 96 to 75% of resin (A).

Claim 16 (previously amended) Material according to Claim 1, wherein the impact modifier further comprises at least one polymer selected from the diblock copolymers S-B.

Claim 17 (cancelled)

Claim 18 (previously amended): Material according to Claim 16, wherein the diblock S-B has a number-average molar mass which is between 10,000 g/mol and 500,000 g/mol.

Claim 19 (previously amended): Material according to Claim 1, wherein the impact modifier also comprises at least one triblock S-B-S selected from linear triblocks S-B-S and star-shaped triblocks S-B-S.

Claim 20 (currently amended): Material according to Claim 1, wherein part of the triblock S-B-M is replaced with a pentablock copolymer M-B-S-B-M.

Claim 21 (cancelled)

Claim 22 (previously amended): Material according to Claim 1, wherein the PPO to polystyrene polymer weight ratio is between 1/9 and 9/1.

Claim 23 (original): Material according to Claim 22, wherein the ratio is between 3/7 and 7/3.

Claim 24 (currently amended): Material according to Claim 1, wherein the B block comprises dienes, ~~polydienes~~ polymerized dienes and/or random copolymers of diene.

Claim 25 (previously added): Material according to Claim 1, wherein the B block comprises an alkyl (meth)acrylate.

Claim 26 (currently amended): Rigid material based on PPO and an aromatic vinyl resin with improved impact strength comprising:

- 99 to 20% of a resin (A) consisting of a mixture of PPO and of an aromatic vinyl resin, the aromatic vinyl resin being selected from the group consisting of polystyrene homopolymers consisting of styrene units, acrylonitrile butadiene styrene polymers, and high impact polystyrene polymers, and
- 1 to 80% of an impact modifier comprising:
 - (i) at least one block copolymer S-B-M in which:
 - each block is linked to the other by a covalent bond or an intermediate molecule linked to one of the blocks by a covalent bond and to the other block by another covalent bond,

- M consists of MMA monomers optionally copolymerized with other monomers and comprises at least 50% by weight of methyl methacrylate (MMA),
 - B is incompatible with the resin (A) and with the M block and its glass transition temperature Tg is less than 0°C,
 - S is incompatible with the B block and the M block and its Tg or its melting point m.p. is greater than the Tg of B,
 - S is compatible with the resin (A); and
- a pentablock copolymer M-B-S-B-M.